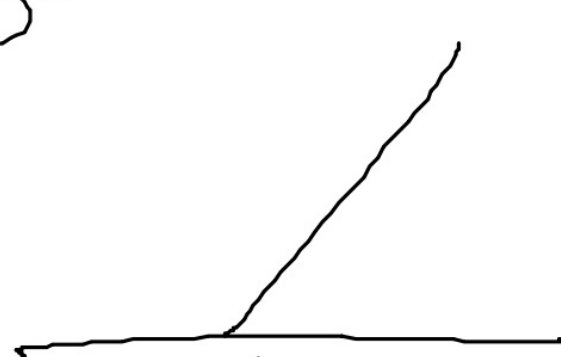
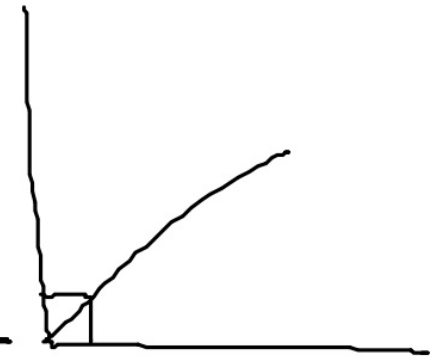


Right angle -  $90^\circ$

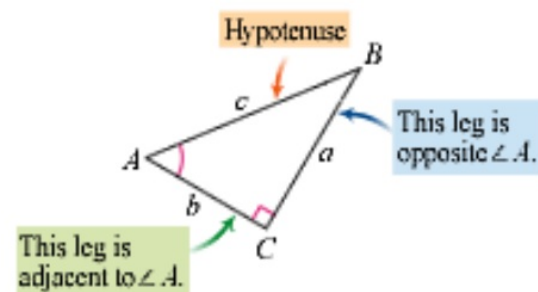


Supplementary  
add to  $180^\circ$



Complementary  
add to  $90^\circ$

## Trigonometric Ratios



For any acute angle  $A$  in a right triangle, the **sine** of  $\angle A$  is the ratio of the length of the leg opposite  $\angle A$  to the length of the hypotenuse.

$$\sin A = \frac{\text{opposite leg}}{\text{hypotenuse}} = \frac{a}{c}$$

The **cosine** of  $\angle A$  is the ratio of the length of the leg adjacent to  $\angle A$  to the length of the hypotenuse.

$$\cos A = \frac{\text{adjacent leg}}{\text{hypotenuse}} = \frac{b}{c}$$

The **tangent** of  $\angle A$  is the ratio of the length of the opposite leg to the length of the adjacent leg.

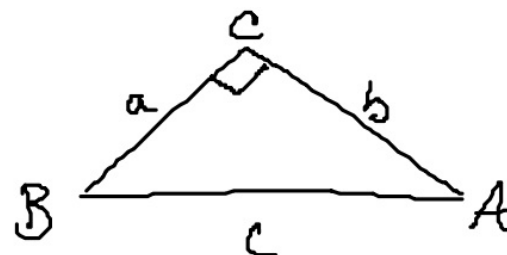
$$\tan A = \frac{\text{opposite leg}}{\text{adjacent leg}} = \frac{a}{b}$$

$$\text{S} = \frac{\text{O}}{\text{H}} \quad \text{C} = \frac{\text{A}}{\text{H}} \quad \text{T} = \frac{\text{O}}{\text{A}}$$

## SOH CAH TOA

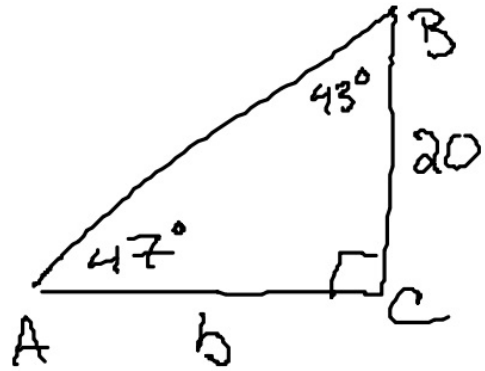
$$\sin(90) = 1$$

$$\tan(45) = 1$$



isoceles

$$\angle B = \angle A$$

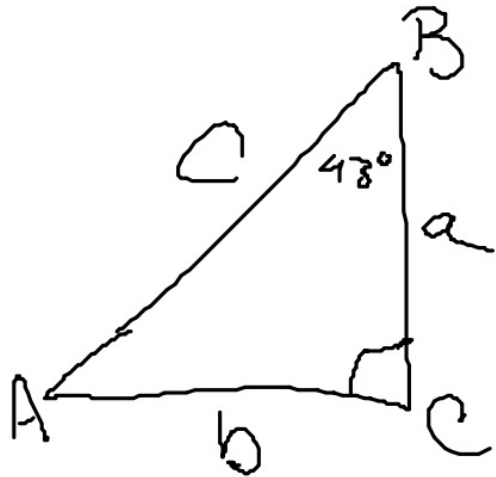


SOH CAH TOA

$$20 \times \tan(43) = \frac{b}{20} \quad +20$$

$$b = 20 \tan(43)$$

$$b = 18.7$$



$$\sin(B) = \frac{b}{c} \quad \tan(B) = \frac{b}{a}$$

$$\cos(A) = \frac{b}{c} \quad \tan(A) = \frac{a}{b}$$

$$\sin(B) = \cos(A)$$

$$\sin(A) = \cos(B)$$

$$\tan(B) = \frac{1}{\tan(A)}$$

Inv.



Bearing is degrees  
away from N going  
Clock-wise.

$90^\circ = \text{east}$ ,  $180^\circ = \text{south}$ ,  
 $270^\circ = \text{west}$

$$23 \frac{\text{mi}}{\text{h}} \quad t = \text{time (h)}$$

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$$A(\text{mi}) = 23 \left( \frac{\text{mi}}{\text{h}} \right) t (\text{h}) = 23t(\text{mi}) \quad 750 = 23t$$

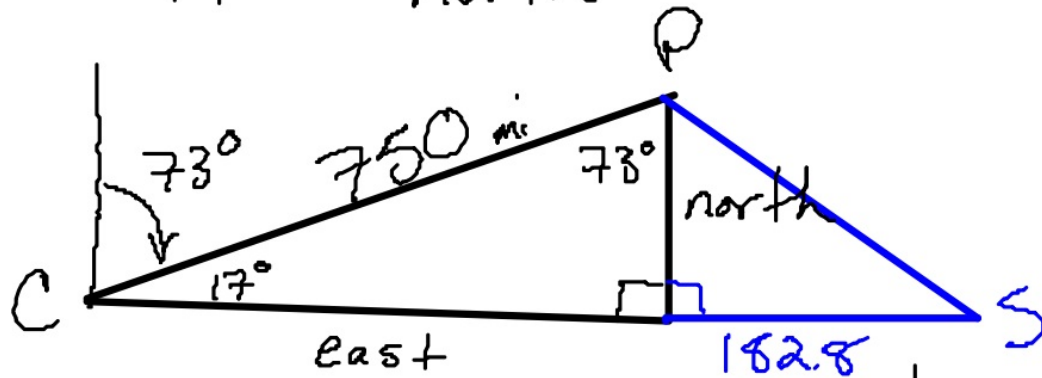
$$t_A = 32.6 \text{ h}$$

$$B(\text{mi}) = 23t(\text{mi}) \quad 900 = 23t$$

$$t_B = 39.1 \text{ h}$$

How far east of CC is PC?

SOHCAHTOA



$$\text{east} \cos(17) = \frac{\text{east}}{750}$$

$$\text{north} \sin(17) = \frac{\text{north}}{750}$$

$$\begin{aligned} \text{east} &= 750 \cos(17) \\ &= 717.2 \text{ mi} \end{aligned}$$

$$\begin{aligned} \text{north} &= 750 \sin(17) \\ &= 219.3 \text{ mi} \end{aligned}$$

Ex B

east 2.85 km  
south 6.03 km

SOHCAHTOA

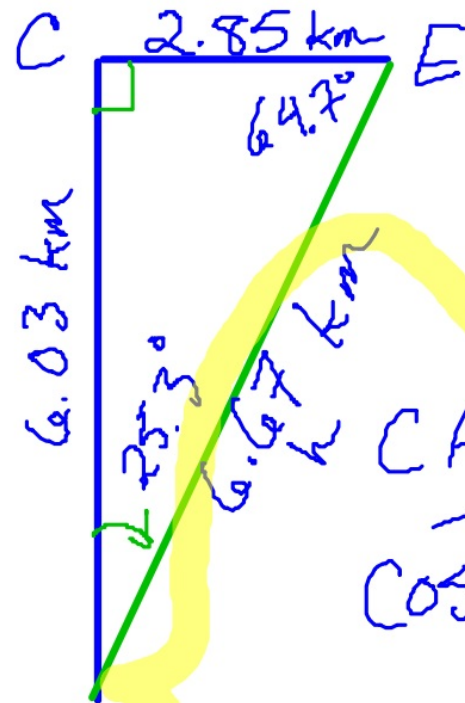
$$\tan(N) = \frac{2.85}{6.03} = 0.48$$

$$\tan(N) = 0.48$$

$$\tan^{-1}(\tan(N)) = \tan^{-1}(0.48)$$

$$1N = \tan^{-1}\left(\frac{2.85}{6.03}\right)$$

$$N = 25.3^\circ$$



$$\cos = \frac{\text{Adj}}{\text{Hyp}}$$

$$\cos(E) = \frac{2.85}{6.67}$$

$$\frac{\cos(E)}{\cos(E)} = \frac{2.85}{\cos(E)}$$

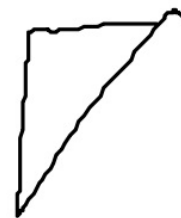
$$h = \frac{2.85}{\cos(64.7)}$$

2/9

$$\frac{X'}{X'} = X' \cdot X'^{-1} = 1$$

$$\frac{2}{3} \div \frac{3}{4} = \frac{2}{3} \times \frac{4}{3}$$

$$\frac{\frac{2}{3}}{\frac{3}{4}} = \frac{2}{3} \cdot \frac{4}{3}$$



$$\tan' \cdot \tan^{-1} = 1$$

$$\tan(n) \uparrow$$

$$\cos(n) \quad \cos^{-1}(n)$$

$$\sin(A) = \frac{k}{j} \quad \sin^{-1}(A) = \frac{j}{k}$$

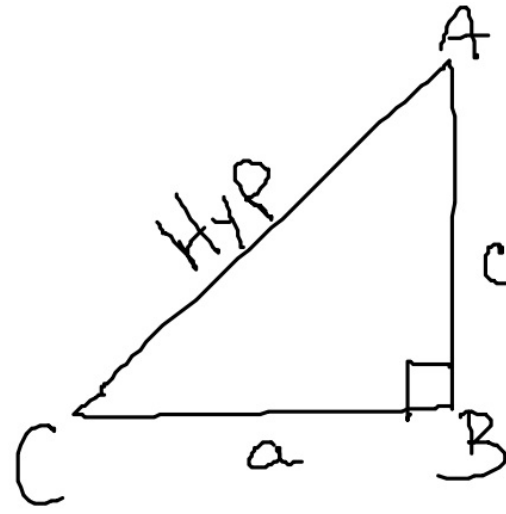


SOH CAH TOA

$$\sin = \frac{\text{Opposite}}{\text{Hyp}}$$

$$\cos = \frac{\text{Adj}}{\text{Hyp}}$$

$$\tan = \frac{\text{Opp.}}{\text{Adj}}$$

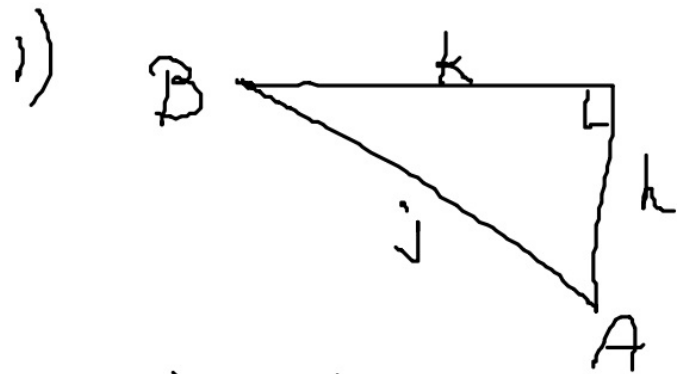


$$\tan(A) = \frac{a}{c}$$

$$\tan(C) = \frac{c}{a}$$

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#1-4





SOH CAH TOA

$$\sin(A) = \frac{k}{j}$$

$$\sin^{-1}(A) = \frac{j}{k}$$

$$\cos(A) = \frac{h}{j}$$

$$\cos^{-1}(A) = \frac{j}{h}$$

$$\tan(A) = \frac{k}{h}$$

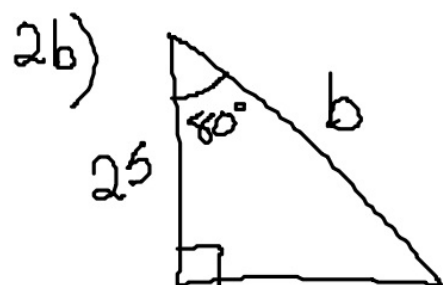
$$\tan^{-1}(A) = \frac{h}{k}$$

$$\tan(A) = \frac{k}{h} = \tan^{-1}(B)$$

2a)



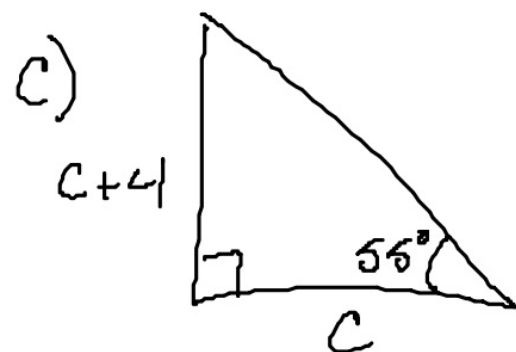
$$\sin(20) = \frac{a}{12} \quad a = 12 \sin(20) = 4.1$$



$$\cos(80) = \frac{25}{b}$$

$$b = \frac{25}{\cos(80)} = 14.4$$

$$(4 / \tan(55)) / (1 - (1 / \tan(55)))$$



$$\tan(55) = \frac{c+4}{c}$$

$$c = \frac{c+4}{\tan(55)} = \frac{c}{\tan(55)} + \frac{4}{\tan(55)}$$

$$c - \frac{c}{\tan(55)} = \frac{4}{\tan(55)}$$

$$c \left( 1 - \frac{1}{\tan(55)} \right) = \frac{4}{\tan(55)}$$

$$c = \frac{\frac{4}{\tan(55)}}{\left( 1 - \frac{1}{\tan(55)} \right)} = \frac{4 \tan^{-1}(55)}{\left( 1 - \tan^{-1}(55) \right)}$$

$$c = 9.3$$